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IX.—*Report on a Second Collection of Sponges from the Gulf of Manaar.* By ARTHUR DENDY, M.Sc., F.L.S., Demonstrator and Assistant Lecturer in Biology in the University of Melbourne.

[Plates III.–V.]

A LITTLE more than a year ago I published in this Journal an account* of a collection of sponges made by Mr. Edgar Thurston, Superintendent of the Government Central Museum at Madras, off the shores of the Island of Rámeswaram in the Gulf of Manaar. Shortly before leaving England I received from Mr. Thurston a second collection, obtained in the neighbourhood of the Tuticorin Pearl Banks. This collection was of even greater interest than the first, and its value was greatly enhanced by the fact that Mr. Thurston had carefully preserved portions of nearly all the species in spirit, and had also kept a record of the colours of the sponges in the living state. Unfortunately my report on this collection has been greatly delayed by pressure of other work, and even now I feel that I have been unable to do full justice

* "The Sponge-fauna of Madras," Ann. & Mag. Nat. Hist. ser. 5, vol. xx. p. 153.

to the material at my disposal. To illustrate the Report fully eight or ten quarto plates would have been required, and I was unable to make arrangements for obtaining these before leaving England. I have therefore thought it best, in preference to delaying any longer, to publish full descriptions of the species in this place, together with such illustrations as were practicable under the circumstances.

The pieces preserved in spirit proved of very great service and enabled me to investigate to a certain extent the minute anatomy of one or two of the species, and especially of *Spongionella nigra*, in the case of which it would have been quite impossible without spirit-preserved material to determine the true characters of the sponge. I hope that I may be able to make fuller use of the spirit-preserved material for anatomical investigation at a later date.

The collection comprises twenty-four determinable species, of which fourteen are new to science and two are represented by new varieties. Of the twenty-four species one belongs to the Tetractinellida, nineteen to the Monaxonida, and four to the Ceratosa, and there is also an undeterminable species of *Hircinia*.

Amongst the old species there are several forms of very great interest, chief amongst them being *Axinella tubulata*, a sponge hitherto scarcely known at all and whose peculiar characters, which were most curiously misunderstood by Dr. Bowerbank, are here shown to be due to the presence of a commensal tubicolous Annelid. Amongst the new species the most important is undoubtedly *Spongionella nigra*, of which I give a full account later on.

The colours of the sponges in life were, as usual, very varied and brilliant. Judging from what Mr. Bracebridge Wilson, who has had great experience in dredging sponges in the neighbourhood of Port Phillip, tells me, I am inclined to believe that the colours of the living sponges will be found to be of great service in distinguishing the species. Some idea of the brilliance and variety of the natural colouring may be gained from the following complete list of the species in Mr. Thurston's second collection.

TETRACTINELLIDA.

Tetilla hirsuta, n. sp. (No colour recorded.)

MONAXONIDA.

Petrosia testudinaria, Lamarck, sp. Pink.
Reniera madrepora, n. sp. (No colour recorded.)

Pachychalina multiformis, Lendenfeld, sp., var. *manaar-ensis*, nov. Pale violet or light pink.
—— *delicatula*, n. sp. (No colour recorded.)
—— *spinilamella*, n. sp. Pale yellow.
Siphonochalina communis, Carter, sp. Bluish brown.
—— *crassifibra*, n. sp. Deep blue.
Gelliodes carnosa, n. sp. Grey.
Iotrochota baculifera, Ridley, var. *flabellata*, Dendy. Black (in spirit or when dry dark purple).
Clathria indica, n. sp. Bright red.
—— *corallitincta*, n. sp. Coral-red.
Rhaphidophlus spiculosus, n. sp. Vermilion.
Hymeniacidon? fœtida, n. sp. Grey.
Axinella labyrinthica, n. sp. Bright orange.
—— *Donnani*, Bowerbank, sp. Orange.
—— *tubulata*, Bowerbank, sp. Pinkish red or red.
Ciocalypta Tyleri, Bowerbank, var. *manaarensis*, nov. White.
Auletta aurantiaca, n. sp. Bright orange.
Acanthella Carteri, n. sp. Orange-red.

CERATOSA.

Spongionella nigra, n. sp. Black.
Hircinia clathrata, Carter. Reddish brown.
—— ? sp. Blackish grey.
Aplysina purpurea, Carter. Grey (in spirit, or, when dry, dark purple).
—— *fusca*, Carter. (No colour recorded.)

Specimens of all these species, which I shall now describe, are in the British Museum, South Kensington. The spicular terminology here employed is that given in the 'Challenger' Reports on Monaxonida and Tetractinellida.

TETRACTINELLIDA.

Tetilla hirsuta, n. sp.

This species is represented in the collection by two good specimens, each of which is spherical and attached to a stone by the base. The larger of the two specimens is 40 or 50 millim. in diameter. There is no record of the colour of the sponge in the living state, but in spirit the specimens are dark grey, almost black. The surface of the sponge is hirsute, owing to the presence of long spicules projecting outwards and downwards in a thatch-like manner. The con-

tinuity of the surface is interrupted at irregular intervals by a number of pits or depressions, which form a very conspicuous external character. Some of the pits are shallow and hemispherical, others deep and tubular; some have in their floor the evident openings of a number of oscular tubes, while others are lined by a smooth continuous membrane which presents no openings to the naked eye. In sections the floor of a pit is sometimes seen to be perforated by a number of very small pores, which are doubtless inhalant. I have not been able to work out in detail the arrangement of the pores and oscula; but from the examination of my sections I have come to the conclusion that some of the surface-pits are localized pore-areas, while others are oscular areas. This condition recalls that described by Professor Sollas in his *Cinachyra barbata* *; but further investigations are required to enable one to say how far the resemblance holds good; in any case the two species appear to be quite distinct, and the arrangement of the oscula, although in both they are confined to special pits on the surface, appears to be different in the two cases.

The skeleton of the sponge is arranged in a perfectly typical radiate manner, the stout radiating fibres all starting from a dense central nucleus. There is no special cortical skeleton of radiately disposed oxea, such as occurs in *Cinachyra*.

Spicules.—(*a*). Megasclera:—(1) Very long, fusiform, straight oxea, tapering very gradually to a fine point at each end; size about 3·5 by 0·042 millim. (2) Protriænes, with very long and very slender shaft and rather short, sharp-pointed cladi; length of shaft in a well-developed example about 0·46 millim., diameter about 0·014 millim.; length of cladi about 0·049 millim., diameter at base about 0·007 millim. These spicules are often of hair-like dimensions. (3) Anatriænes, with shaft perhaps somewhat shorter than that of the protriæne and often of hair-like thinness.

(*b*). Microsclera:—Very small slender sigmaspires, about 0·022 millim. long.

Concerning the details of the histology and canal-system of this sponge I am not able to give much information. It is difficult to work out, owing to the great development of spicules, and I have only the smaller of the two specimens at my disposal. The ectosome is fairly thick and gelatinous, with a tendency to become fibrous. The choanosome presents

* Report on the Tetractinellida of the 'Challenger' Expedition, p. 23.

a condition intermediate between collenchymatous (gelatinous) and sarcenchymatous (granular). The flagellated chambers are more or less spherical and about 0·02 millim. in diameter; their mode of opening I have not been able to determine precisely.

MONAXONIDA.

Petrosia testudinaria, Lamarck, sp. (Pl. III. figs. 1, 2, 3.)

1815. *Alcyonium testudinarium*, Lamarck, Mémoires du Muséum d'Histoire naturelle, tome i. p. 167.
1882. *Reniera crateriformis*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. x. p. 115.
1884. *Reniera testudinaria*, Ridley, Zool. Coll. H.M.S. 'Alert' (Brit. Mus.), p. 409.
1887. *Reniera crateriformis*, Carter, Journ. Linn. Soc., Zool. vol. xxi. p. 71.

This species is represented in the collection by a single very fine cup-shaped specimen (Pl. III. fig. 1). It measures 40 centim. in height and 127 centim. in maximum circumference; the longer diameter of the aperture of the cup is 38 centim., the shorter diameter 17 centim., and the depth of the cup 18 centim.; the diameter of the base of the sponge is 30 centim.

The outer surface of the sponge is beset with very prominent parallel ridges running vertically upwards; these ridges are much better defined and more regular and continuous than in any other specimen in the British-Museum collection; their average height is 4 or 5 centim. and the average distance between them is 5 centim.

The colour of the sponge in the living state is pink, in the dry state light brownish yellow. The texture of the dry specimen is fragile and crumbling.

The sponge is lipostomous; wide canals are seen running outwards at right angles to the general surface of the sponge and terminating underneath networks on the margins of the ridges.

There are similar covered oscula on the inside of the cup. It thus appears that the oscula occur on the inside of the cup and on the ridges, but are hidden by a spicular network similar to that which covers the general surface of the sponge, only coarser.

The skeleton is a close irregular network of stout fibres composed of a great number of spicules loosely and irregularly bound together.

The spicules are slightly curved, ranging in form from

oxeote to strongylote; they vary much in size, especially in diameter, the average measurements of a full-grown spicule being about 0·37 by 0·0175 millim.

My examination of a very fine series of specimens in the British Museum has shown me that the spiculation of this species varies considerably; but I know of no tangible characters whereby the different varieties can be separated.

The specimen collected by Dr. Anderson in the Mergui Archipelago (fig. 2) resembles Mr. Thurston's specimen in texture and cup-like shape; but the surface-ridges are much more jagged and irregular and the spicules are rather larger.

Ridley's cup-shaped specimen from the 'Alert' collection differs in its thin walls, tougher texture, and small size, but agrees pretty well in spiculation.

Lamarck says of his specimen:—"Cet alcyon forme une plaque elliptique, un peu convexe en dessus, concave en dessous comme s'il s'étoit moulé sur le dos de quelque crabe, et rappelle la forme de la carapace supérieure d'une tortue." Probably his specimen was only a fragment of the side of a cup. The fragment in the British Museum, purporting to come from Lamarck's collection, agrees very well in general appearance with our present specimen, so far, of course, as can be judged from a small piece; the spicules measure 0·47 by 0·017 millim. and have well-rounded ends.

Reniera madrepora, n. sp. (Pl. IV. fig. 9.)

The single specimen in the collection is bushily ramose; it branches very freely, and the branches are short, subcylindrical or somewhat flattened, and often anastomose. The branching shows a decided tendency to become palmate and there is a short stout pedicel. The height of the specimen is 150 millim. and the greatest breadth a little more; the average diameter of the branches is about 8 millim. The oscula are small and scattered, chiefly on the inwardly-turned faces of the branches. The surface in the dry state is minutely hispid, the texture rather hard but brittle, and the colour dull orange. No record was kept of the colour in the living state.

The skeleton is arranged in the rectangular manner characteristic of the genus, with obvious distinction into primary and secondary fibres; but it is irregular, and, though dense, the spicules are loosely bound together and may occur scattered outside the true primary and secondary lines of the skeleton. In the centre of the branches the skeleton becomes

very dense and irregular and contains a large amount of spongin.

The spicules (fig. 9) are slightly curved oxea, tapering gradually to a sharp point at each end. Average size of full-grown spicule about 0·175 by 0·007 millim.

This species resembles most nearly Bowerbank's *Isodictya dichotoma* *, but the growth is much more robust, the texture harder, the skeleton less regularly arranged, and the spicules longer than in that species, so that, taking into consideration the great difference in locality, I have thought it desirable to keep them separate.

Pachychalina multiformis, Lendenfeld, sp., var. *manaarensis*, nov.

1887. *Ceraochalina multiformis*, Lendenfeld, Zoologische Jahrbücher, Bd. ii. p. 783.

This variety is represented in the collection by fifteen dry specimens and two pieces in spirit. The sponge consists of erect, sessile, flattened lamellæ, with irregularly undulating and frequently proliferating surface. The colour of the living sponge was in one case pale violet and in another light pink; when dry it is greyish yellow, orange, or pale violet, and in spirit greyish yellow. The largest specimen is 250 millim. wide and 175 millim. high and the thickness of the lamellæ is about 5 millim. The texture of the dry specimens is tough and rather hard. The oscula are numerous and confined almost entirely to one surface of the lamellæ; they are about 1 millim. in diameter and they have slightly raised margins.

The dermal skeleton is a close network of relatively stout horny fibres, containing spicules for the most part uniserially arranged.

The main skeleton is a fairly regular rectangular network of stout horny fibres containing a great deal of spongin. The spicules are numerous in the primary fibres and few in the secondaries; they also occur outside the fibres.

The spicules are short slender oxea, straight or very slightly curved; the average size of a full-grown example is about 0·077 by 0·0036 millim.

The external form of this variety is characteristic and fairly constant. Six dry specimens of it also occur in Mr. Thurston's first collection, but are not mentioned in my Report; three of these are of a violet colour, and the other three are of

* Mon. Brit. Spong. vol. ii. p. 309, vol. iii. pl. liii. figs. 12–14.

a greyish-yellow colour. They exhibit a more strongly marked tendency to form digitate processes than do the specimens in the second collection.

Pachychalina delicatula, n. sp.

Sponge erect, sessile, bushily lamellar, with a slight tendency to throw off digitate processes. Very delicate in appearance. Surface smooth, covered by a very delicate dermal membrane. Texture open, resilient. Colour in the dry state light yellow. Oscula situated chiefly on the margins of the lamellæ. The single specimen in the collection is 180 millim. high and 220 millim. in greatest breadth. The lamellæ measure up to 21 millim. in thickness at the margin, but usually much less. The oscula average about 3 millim. in diameter.

The dermal skeleton is a close-meshed irregular reticulation of slender horny fibre containing very slender spicules arranged sometimes uniserially and sometimes multiserially. The main skeleton is a wide-meshed reticulation of very stout primary and secondary fibres. Both primary and secondary fibres are composed of a very great number of slender spicules packed close together all through the fibre and united by spongin. Both primary and secondary fibres average about 0·126 millim. in diameter. The wide interspaces between them are partially occupied by an irregular network of very much slenderer polyspiculous fibres * about 0·0175 millim. in diameter, branching and anastomosing freely with each other and with the primaries and secondaries. Numerous spicules occur scattered outside the fibres.

The spicules are very slender slightly curved oxea, measuring about 0·098 by 0·0035 millim.

Pachychalina spinilamella, n. sp.

Sponge consisting of erect, flattened, frondose or digitate thick lamellæ. Both surfaces of the lamellæ are covered with numerous short stout spines. The largest specimen is attached to a mass of nullipore; it is 160 millim. high and 185 millim. broad, while the thickness of the lamellæ is about 13 millim. (Another specimen consists of a short stalk about 47 millim. high and 20 millim. in diameter, dividing into two upright flattened branches, one of which is hollow, penetrated by a wide, vertical, osculur tube; total height of

* For the sake of convenience these fibres may be termed "tertiary."

specimen 135 millim.) The oscula are rather large, commonly about 4 millim. in diameter in well-grown specimens; they occur on one surface only of the lamellæ and sometimes round the margin. The dermal membrane is distinct, with a well-developed reticulation of spiculo-fibre.

The colour in life was pale yellow; when dry it is brownish yellow, and the same colour, only darker, in spirit. Texture in the dry state tough and hard, but rather open. When the sponge is held up to the light stout primary skeleton-fibres are seen ramifying upwards in a dendritic manner and terminating in the conuli on the surface.

The dermal skeleton is a quite irregular network of very stout fibres, containing a great number of closely packed spicules whose meshes are subdivided by an irregular network of very slender fibres both uni- and multispiculous.

The main skeleton is also irregular and composed of very stout primary fibres about 0·18 millim. in diameter, rather slenderer secondaries and slender tertiaries, about 0·015 millim. in diameter. All the fibres contain a very great number of spicules, closely packed side by side, and occupying almost the whole thickness of the fibre; but there is plenty of spongin uniting them together. Spicules are abundantly scattered about outside as well as in the fibres.

The spicules are relatively long, very slender oxea, usually slightly curved, measuring about 0·126 by 0·0017 millim. They are gradually and sharply pointed at each end.

There are in the collection four dry specimens of this sponge and a piece in spirit.

Siphonochalina communis, Carter, sp.

1881. *Tubulodigitus communis*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. vii. p. 367.

With this species I identify a single fine specimen attached to a fragment of rock, to which is also attached a small specimen of *Hircinia clathrata*. The sponge consists of a thin incrusting basal mass, spreading over the surface of the rock and throwing out abundant short, upright, tubular processes, each terminating in a single osculum. The tubes reach some 70 millim. in maximum height and the oscula average about 4 millim. in diameter. The tubes anastomose freely with one another and also branch to some extent; they average about 5 or 6 millim. in diameter.

The colour in life was bluish brown; in spirit it is yellowish brown, and when dry the same with a decidedly purplish

tinge. The texture in the dry state is stiff and resilient, but very brittle.

The dermal skeleton is a delicate close-meshed network of relatively stout horny fibre cored by uniserially arranged slender spicules.

The main skeleton is composed of stout primary and secondary fibres arranged rectangularly and fairly regularly, cored by slender spicules arranged uniserially in the secondary fibres and either uni- or multiserially in the primaries. Spicules also occur plentifully scattered outside the fibres.

The spicules are slender, very slightly curved oxea, gradually sharp-pointed at the ends, measuring when full-grown about 0·126 by 0·0047 millim.

Mr. Carter gives no generic diagnosis of *Tubulodigitus*, and the species falls very well under *Siphonochalina* as at present understood. His specimens also came from the Gulf of Manaar.

Siphonochalina crassifibra, n. sp.

The single specimen in the collection consists of four tubes arising from a common base. Three of them grow up side by side in the same plane, while the fourth, which is smaller, lies in a different plane, either in front of or behind the other three, according to the point of view. There are evident traces of the existence, in the living sponge, of a fifth tube, which has been taken off and preserved in spirit. The tubes are subcylindrical, but slightly compressed in one plane, and they are constricted occasionally at irregular intervals. Each tube has a large oscular opening at the top. The total height of the specimen is 150 millim., the diameter of the tubes about 25 millim., and the thickness of the tube-wall about 7 or 8 millim., but variable. The surface of the tubes, owing to the projection of the ends of the stout primary fibres, is coarsely granular. It has also a reticulate appearance, due to the arrangement of the dermal skeleton. The colour of the living sponge was deep blue, in spirit and in the dry state it is brown, in the dry state with a decided tinge of purple. The texture is coarsely fibrous, resilient.

The dermal skeleton is an irregular network of coarse fibre, whose meshes are broken up by an equally irregular network of fine fibre. Both sets of fibres contain numerous spicules and an abundance of spongin ; the spicules are rather loosely scattered through the fibre, but usually more numerous in the axis than towards the periphery ; sometimes also they are

placed more or less at right angles to the long axis of the fibre, so as to echinate it, usually in irregular groups.

The main skeleton is a rectangular network of stout primary and secondary fibres, the primaries measuring about 0·14 and the secondaries about 0·084 millim. in diameter. Both primaries and secondaries consist of a large amount of clear transparent spongin, with an axial core of slender spicules multiserially arranged. The spicules are numerous in both sets of fibres, but more so in the primaries than in the secondaries. Numerous spicules occur scattered outside the fibres.

The spicules are slightly curved, slender oxea, gradually sharp-pointed at each end, measuring about 0·084 by 0·0035 millim.

Gelliodes carnosa, n. sp. (Pl. IV. fig. 7.)

Sponge erect, sessile, more or less lamellar, proliferous; sometimes rising into short tubular processes. The arrangement of the oscula and oscular tubes gives to the sponge a very characteristic appearance. The oscula are very numerous and occur chiefly on the margins of the sponge, but also on isolated papillæ. They average 2 to 3 millim. in diameter and lead into long, narrow, vertical oscular tubes. The presence of these tubes causes the surface of the lamellæ in which they lie to be more or less ribbed vertically, so that the course of an oscular tube can be traced for some distance by means of the rounded ribs on the surface. The largest specimen is 180 millim. high by 200 millim. broad. The thickness of the actual lamellæ is about 6 or 7 millim.

The colour in the living state was grey and it is also brownish grey when dry. The surface is smooth but uneven, with rather a fleshy appearance; in spirit it appears glabrous. The texture is tough and resilient.

The skeleton is very strongly developed, composed of a very close, more or less regularly rectangular reticulation of unusually stout horny fibre. The primary lines have a multispicular core of oxeote spicules, while the secondaries have fewer spicules. In some parts the arrangement of the skeleton becomes less regular, but it is throughout characterized by a very strong development of spongin.

Spicules.—(*a*). Megasclera :—Small, usually slightly curved, gradually sharp-pointed oxea (fig. 7, *a*, *b*), measuring about 0·126 by 0·006 millim.

(*b*). Microsclera :—Very small and very slender sigmata (fig. 7, *c*), about 0·017 millim. long; visible after soaking

for some time in Canada balsam, when they appear abundantly.

This is a well-marked species with a very characteristic external form; there are five dry specimens of it in the collection, so that it would appear to be plentiful.

Iotrochota baculifera, Ridley, var. *flabellata*, Dendy *.

There are in the collection a single very fine dry specimen of this variety and two small pieces preserved in spirit. The dry specimen is shaped like the leaf of a Spanish chestnut, consisting of a single flattened frond which has grown up around the stem of some plant for an axis. It is 325 millim. in height and 130 millim. in greatest breadth; the thickness is variable, up to about 10 millim. along the margin, but much more in the centre. On either surface of the flattened frond irregular proliferations are given off. A noteworthy feature of this specimen is the presence of grooves on both surfaces of the sponge radiating towards the margin in an outward and upward direction, like the veins of a Spanish-chestnut leaf. Both dry and spirit specimens contain a large quantity of sand. The colour of the living sponge was black, when dry or in spirit it is dark purple. The texture when dry is very fragile, the sponge crumbling up between the fingers like a *Dysidea*; in spirit, however, it is fairly tough.

The specimen may possibly have grown erect; but from the difference in shade of colour between the two sides and from the somewhat worn appearance of the lighter one I am inclined to think that the latter was lowermost during life.

The oscula are rather small and occur chiefly along the margin.

Clathria indica, n. sp. (Pl. IV. fig. 10.)

Sponge erect, flabellate, consisting of a number of flattened, branching, and anastomosing trabeculæ, fused together so as to form a more or less continuous frond; sometimes growing out into free digitate processes. Texture in the dry state coarse and hard, fibrous and tough, in spirit softer. Colour of the living sponge bright red, when dry or in spirit yellowish brown. The oscula are apparently represented by very numerous minute openings thickly strewn over both

* For references *vide* Dendy, Ann. & Mag. Nat. Hist. ser. 5, vol. xx. p. 158.

surfaces of the sponge. An average-sized well-grown specimen measures about 180 millim. in height by 280 millim. in breadth, and the thickness of the trabeculæ of which it is composed is about 4 millim. Sometimes, however, the sponge is taller than it is broad.

The skeleton is a very well-developed close-meshed network of stout horny fibres echinated by spined styli. The distinction between primary and secondary lines is not always very well marked, and the reticulation tends to become very irregular; the primary fibres, however, are more abundantly echinated than the secondaries and they have also numerous spined styli in the axis of the fibre, which are absent from the secondaries.

The primary fibres measure about 0·07 millim. in diameter, but sometimes more and sometimes less, and the secondaries somewhat less.

Spicules.—The megasclera (fig. 10) are of two kinds:—(1) Smooth slender styli (verging upon the tylostylote form) or unequal-ended oxea, straight or slightly crooked, measuring about 0·14 by 0·003 millim., occurring abundantly scattered in the dermal membrane, but only sparingly in the choanosome. (2) Small, straight, entirely spined styli, gradually and sharply pointed at the apex, and frequently narrowing somewhat at the base; size about 0·084 by 0·007 millim.

I can find no microsclera, although I have searched very carefully for them, and this species therefore appears to be one of those aberrant members of the genus which are devoid of microsclera. The species appears to be abundant, being represented in the collection by eight dry specimens and a piece in spirit.

Clathria corallitincta, n. sp. (Pl. IV. fig. 8.)

Sponge sessile, usually lamellar, but proliferous. Consisting of a close reticulation of small, branching and anastomosing, irregularly cylindrical or flattened trabeculæ, ramifying upwards and terminating on the surface of the sponge in short obtuse processes. The largest specimen is 265 millim. broad by 131 millim. high. The diameter of the separate trabeculæ of which the sponge is composed averages about 2–3 millim. Texture in the dry state rather hard and brittle, in spirit tough, resilient. The living sponge was "red-coral" coloured; in spirit it is yellowish grey, and when dry the same, with tinges of red here and there.

The reticulate or clathrous character of the sponge is not so well marked in spirit as in the dry condition, the fenestra-

tions being frequently filled up by delicate membranous tissue.

The arrangement of the horny skeleton agrees very well with that in *Clathria indica*, but the spicular element is more strongly developed, though scarcely at the expense of the horny fibre. There are an abundance of smooth styli enclosed in the primary lines of the skeleton.

Spicules.—(*a*). Megasclera:—(1) Smooth styli (fig. 8, *a*, *b*, *c*), straight or slightly curved, gradually sharp-pointed, and of two principal sizes—(*α*) stout and relatively short, averaging about 0·175 by 0·008 millim., abundant and occurring principally in the choanosome; (*β*) long and slender, sometimes becoming slightly tylostylote, averaging about 0·22 by 0·005 millim., occurring principally in the dermal membrane. (2) The echinating spicules (fig. 8, *d*); these are short and relatively stout spined tylostyli, gradually and very sharply pointed at the apex, and narrowing somewhat towards the base, which is commonly expanded into a slight head; the spines are scarce or absent for a short distance above the base; size of spicule about 0·056 by 0·006 millim.

(*b*). Microsclera:—A few very minute slender isochelæ of the usual *Clathria* type, about 0·014 millim. long. In an embryo enclosed in the sponge there are also some small and exceedingly slender toxa, and it is not unlikely that such may also exist in the adult sponge, where they might escape detection amongst the mass of larger spicules.

This species is represented in the collection by five specimens and a piece in spirit.

Rhaphidophlus spiculosus, n. sp. (Pl. IV. fig. 4.)

There is in the collection a single dry specimen and a piece in spirit. The dry specimen forms a flattened clathrous mass of branching and anastomosing flattened trabeculæ *. It seems to be a good deal shrunk up and measures in its present condition 108 millim. in length and 72 millim. in breadth, while the thickness of the trabeculæ averages about 5 millim. It is impossible to say whether the species is erect or decumbent in life.

The colour of the living sponge was vermilion; when dry it is light brownish yellow, with occasional red tinges, and in spirit it is darker greyish yellow.

The texture in spirit is compact and cork-like. The oscula are minute and scattered, mostly on or near the margins of

* That this flattening is normal is shown by the spirit specimen.

the flattened trabeculæ. The surface of the sponge is very uneven, subglabrous in appearance in spirit, rough in the dry condition.

The main skeleton is a dense irregular reticulation of stout horny fibres, with rounded meshes. The fibres are about 0·1 millim. in diameter, but variable; they are abundantly but irregularly cored by long slender tylostyli and sparsely echinated by short spined tylostyli. Between the fibres of the skeleton the long slender tylostyli are very thickly but irregularly scattered through the soft tissues.

The dermal skeleton is well developed and consists of dense, close-set, radiating brushes of long slender tylostyli with their points projecting outwards.

Spicules.—(*a*). Megasclera:—(1) Long, straight, very slender tylostyli (fig. 4, *a*, *b*, *c*), sharply and gradually pointed at the apex, and with small oval heads at the base, which is sometimes very minutely spined; size of full-grown examples about 0·294 by 0·005 millim. (2) Short, stout, spined, echinating tylostyli (fig. 4, *d*, *e*), with rounded heads and very sharp points; the spines are arranged so as to leave the apex and a space immediately above the head free; average size of spicule about 0·07 by 0·007 millim.

(*b*). Microsclera:—(1) Very minute isochelæ of the usual *Clathria* type, about 0·014 millim. long. (2) Very small, slender, apparently smooth toxa, about 0·056 millim. long.

Hymeniacidon (?) *fœtida*, n. sp. (Pl. IV. fig. 5.)

Sponge massive, sessile, slightly lobose. The single specimen in the collection measures 143 millim. in greatest breadth and 60 millim. in height. The oscula are of fair size and situate on the summits of the low lobes. Surface very distinctly reticulate. Texture in the dry state hard and incompressible, in spirit a little softer. Colour of the living sponge grey; when dry or in spirit the colour is dull blackish grey on the outside and lighter internally.

The main skeleton is a very dense irregular reticulation of large oxea, sometimes aggregated in thick strands or fibres; the spongin is very feebly, if at all, developed. The dermal skeleton is a very close reticulation of stout bands of spicules. The meshes of the reticulation are very small and rounded, and the bands of spicules dividing them are irregular, but so strongly developed as to cover a greater superficial area than the actual meshes. The dermal, like the main skeleton, is composed principally of large oxea, but there are also present

a few small styli arranged with their apices projecting at the surface of the sponge.

Spicules.—(1) Large, curved, gradually sharp-pointed oxea (fig. 5, *b*), measuring about 0·8 by 0·021 millim. (2) Small, slightly curved, smooth styli (fig. 5, *a*), evenly rounded off at the base and gradually sharp-pointed at the apex; commonly narrowing somewhat towards the base; size about 0·2 by 0·007 millim.

The specific name *fœtida* has been given to this sponge on account of the abominable smell, resembling somewhat the smell of Valerian, given out by the dry specimen.

The presence of the small projecting styli in the dermal skeleton recalls the similar condition described by Ridley and Dendy in *Hymeniacidon* (?) *subacerata* *.

Axinella labyrinthica, n. sp. (Pl. V. fig. 12.)

Sponge forming sessile, low-growing, erect, branching and anastomosing lamellæ. Surface uniformly covered with small, close-set, rather slender conuli, each about 2 millim. in height. Colour of the living sponge bright orange; when dry or in spirit yellowish. Texture (dry and in spirit) rather hard and fairly tough. Oscula minute, abundantly scattered between the conuli. The single specimen is 71 millim. in height and 200 millim. in greatest breadth; the thickness of the lamellæ is about 9 millim., including the conuli.

The skeleton is an exceedingly dense irregular network of spicules, in which it is very difficult to make out any distinct fibres; but stout columns of closely aggregated spicules may be seen running one into each of the surface conuli. The surface of the conuli is densely echinated by projecting spicules springing from these columns. We may imagine the whole skeleton derived from a typical axinellid form by excessive development of the spicules, which are closely united together.

Spicules:—(1) Smooth styli (fig. 12, *b*, *c*), usually more or less bent, especially towards the base, and gradually sharp-pointed at the apex; size usually about 0·42 by 0·016 millim. (2) Slender curved strongyla (fig. 12, *a*), as long as or somewhat longer than the styli, but slenderer.

This is a very beautiful species, with a well-marked and characteristic external form.

* *Vide* Report on the 'Challenger' Monaxonida, p. 169.

Axinella Donnani, Bowerbank *.

There are six dry specimens of this sponge in the collection and also two pieces in spirit. I have nothing further to add to the accounts given by Bowerbank and myself, excepting that Mr. Thurston again records the colour of the living sponge as orange.

Axinella tubulata, Bowerbank, sp. (Pl. V. fig. 11.)

1873. *Haliphysema tubulatum*, Bowerbank, Proc. Zool. Soc. Lond. 1873, p. 29, pl. vii.
1878. *Aulospongus tubulatus*, Norman, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 267.

This species is evidently very abundant in the Gulf of Manaar, being represented in the collection by six dry specimens and two pieces in spirit.

The sponge is massive and usually globular or subglobular in shape. The largest specimen in the collection, which is irregularly massive in form and rounded, is 105 millim. in height and 97 millim. in breadth. All the specimens have more or less flattened bases and appear to have been attached during life, and not, as Bowerbank surmised, freely floating. The surface of all the specimens is covered with small conical papillæ whose size varies considerably in different specimens. Thus in one specimen they are comparatively large and isolated from one another, while in another they are small and run into one another in a mæandriniform manner. The colour of the living sponge was pinkish red or red; in the dry state it is orange and in spirit pale yellow. The oscula are small and scattered and sometimes slightly prominent. There is a dermal membrane connecting together the surface conuli at a little distance below their summits. The texture is firm and hard in the dry state and softer in spirit.

The skeleton is composed of stout, irregular, branching columns, radiating towards the surface and terminating in the conuli. Each column is composed of various sizes of stylote and tylostylote spicules, arranged in the usual echinating manner characteristic of the Axinellids, with their points projecting obliquely outwards and towards the surface of the sponge and their bases usually united together by spongin. Numerous spicules also occur scattered through the soft tissues of the sponge which cannot be assigned to any particular

* For references &c. *vide* Dendy, Ann. & Mag. Nat. Hist. ser. 5, vol. xx. p. 158.

column, and it will be evident from the figure (fig. 11) that the columns are not very well-defined structures.

Spicules.—These are of two kinds :—(1) Large smooth styli, more or less curved, especially towards the well-rounded base, which is sometimes slightly swollen ; gradually sharp-pointed at the apex ; size when fully developed about 0·38 by 0·014 millim. (2) Small tylostyli, straight or bent near the base ; with small subglobular heads and very gradually sharp-pointed at the apex ; usually more or less covered with minute spines, which appear, however, to be always absent from the base. These spicules when full-grown average in size about 0·119 by 0·004 millim., the diameter being measured just above the head. It is unnecessary to give figures of these spicules, as this has already been done by Dr. Bowerbank (*loc. cit.*).

This sponge is remarkable for the presence in all specimens of numerous commensal worms. The worms are very small tubicolous Oligochætes. Their tubes (fig. 11, *a*, *b*, *c*) are very slender, averaging about 0·3 millim. in diameter, and they radiate towards the surface of the sponge, opening about at the level of the dermal membrane, in which they appear as minute circular pits easily visible when the surface of the sponge is examined with a hand-lens. Sometimes the margins of the tubes are a little raised, and the tubes usually appear close to the sides of the radiating skeleton columns. Fig. 11 shows portions of three of the worm-tubes, one of them (*a*) opening close to a surface-papilla and still containing the worm. The tubes sometimes branch ; but whether or not the worm likewise does so I have been unable to determine. It is very possible that the presence of these commensal worms has a good deal to do with the characteristic globular shape of the sponge, and one might almost regard the whole structure as a spherical mass of radiately arranged tubicolous worms in which the interstices between the individual tubes are occupied by a sponge. It would be interesting to know whether the worm and the sponge ever live separately or are always associated together.

The worm-tubes are also present in Dr. Bowerbank's type of the species, of which I made a careful examination in the British Museum ; but he laboured under a curious mistake as to their true nature, regarding them as a tubular skeleton proper to the sponge. This mistaken idea led him to give a most remarkable account of the species, for which I would refer the reader to his original paper *, as I have not space to quote it in this place.

* *Loc. cit.*

Dr. Norman was misled by Bowerbank's account; and while he shows that the species cannot be assigned to the genus *Haliphysema*, he proposes for it the new generic name *Aulospongus* *. It is unnecessary, however, to erect a new genus for the reception of this sponge, which falls very well under *Axinella*.

We have here one of the most remarkable cases of commensalism known amongst sponges.

Ciocalypta Tyleri, Bowerbank, var. *manaarensis*, nov.

1873. *Ciocalypta Tyleri*, Bowerbank, Proc. Zool. Soc. Lond. p. 21, pl. iv. figs. 9–12.

Of this variety there are in the collection two good dry specimens and one of the digitate processes preserved in spirit. The external form of the specimens closely resembles Dr. Bowerbank's figure. The surface of the digitate processes is much corrugated. The colour in the living state was white, and it is also dirty yellowish white in the dry state and in spirit. The taller of the two specimens is 55 millim. high and 47 millim. in diameter at the base, which is approximately circular; it bears about a dozen digitate processes, springing from the cushion-shaped base, and sometimes anastomosing, but never branching. The digitate processes are about 8 millim. in diameter at the base.

The skeleton is arranged as usual in the genus, with a dense central axis, from which arise short columns supporting the dermal membrane at their outer ends.

Spicules.—Slightly curved and very gradually and sharply pointed oxea, resembling those of *Halichondria panicea*; occasionally an odd stylote form may be observed amongst the larger ones. They vary very greatly in size; in the dermal membrane they are small and slender, measuring as a rule about 0·3 by 0·007 millim., but with a wide range of variation, though never attaining to nearly the dimensions of those in the central axis; in the axis also they vary greatly, measuring up to about 1·25 by 0·024 millim., though this extreme size appears to be reached only rarely, the average size of the full-grown spicule being about 0·8 by 0·011 millim.

This variety differs from the types of the species in the presence of the very large oxea in the central axis.

The species has hitherto been obtained from Port Eliza-

* *Loc. cit.*

beth *, South Australia †, and the east coast of Australia ‡.

Auletta aurantiaca, n. sp. (Pl. V. fig. 13.)

Sponge bushy, composed of short, branching and anastomosing, thick-walled tubes, frequently united laterally so as to form lamellæ, like pan-pipes. Each tube is open at the top. The largest specimen is 95 millim. high and 105 millim. in diameter; the tubes are pretty constant in diameter, averaging about 6 millim. The surface is minutely hispid both when dry and in spirit. The texture in the dry state is hard and firm, in spirit softer. The colour of the living sponge was bright orange; in the dry state it varies from pale yellow to bright orange, in spirit it is greyish yellow.

The skeleton is very loose and irregular, consisting of stylote and oxeote spicules arranged partly in loose irregular wisps, which run upwards and outwards and terminate in projecting brushes at the surface of the sponge. These represent the primary lines of the skeleton; they are sometimes crossed more or less at right angles by individual spicules or by two or three together, which represent the secondary lines. The whole skeleton is, however, very confused, and spicules occur abundantly scattered through the choanosome which cannot be referred to either primary or secondary skeleton lines. There is a fair amount of spongin present.

Spicules.—These are of two kinds:—(1) More or less curved oxea (fig. 13, *c*, *e*), gradually sharp-pointed at each end, measuring about 0·28 by 0·011 millim., not nearly so abundant as the following. (2) Long, slender, very gradually sharp-pointed styli (fig. 13, *a*, *b*, *d*), generally more or less curved or bent. As usual in the Axinellidæ these spicules vary greatly both in actual size and in proportion of length to thickness; they are usually somewhat larger than the oxea, but sometimes extremely long and slender, measuring up to about 0·8 millim. in length.

There are four specimens of this very pretty species in the collection and also a piece in spirit.

The genus *Auletta* was founded by Schmidt § for his

* Bowerbank, *loc. cit.*

† Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. xvi. p. 366.

‡ Lendenfeld collection in British Museum.

§ 'Grundzüge einer Spongien-Fauna des atlantischen Gebietes,' p. 45.

Auletta sycinularia, but he gives no diagnosis. Vosmaer places the genus near *Chalina* and describes a new species under the name *Auletta elegans* *, which certainly seems to belong to the genus. In his work on the Porifera in Bronn's 'Klassen und Ordnungen des Thierreichs' † he diagnoses the genus as follows:—"Einzelne 'Person,' oder Stock von röhrenförmigen 'Personen.' Skelet besteht aus Bündeln von Spicula, welche vorzüglich in der Längsrichtung verlaufen. Spic. indic. *ac.*^{2} und *tr. ac.* Canal-System unbekannt."

The genus appears to be truly Axinellid ‡, and may be briefly diagnosed as follows:—"Tubular Axinellidæ. Skeleton reticulate. Megasclera monactinal and (sometimes at any rate) also diactinal."

Hitherto the genus has been obtained only from the Atlantic and Arctic Oceans, so that its range is very greatly extended by Mr. Thurston's investigations.

Acanthella Carteri, n. sp. (Pl. IV. fig. 6.)

Sponge erect, but not stipitate, lamellar. Lamellæ thin, irregular, proliferously branching, with sinuous margins. Both surfaces of the lamellæ are covered with short, stout, conical spines and ridges, especially prominent in the dry condition. The largest specimen is 130 millim. high by about 180 millim. broad, and the lamellæ of which it is composed average about 2·5 millim. in thickness in the dry state, excluding the spines and ridges. The texture in the dry state is hard and fairly tough, in spirit it is softer and tougher. The colour of the living sponge was orange-red; in the dry state it is dull reddish orange, and in spirit greyish yellow.

The skeleton is a very irregular network of stylote spicules, extremely dense in certain parts of the sponge, but absent or almost absent in others. There are no definite fibres and these are probably represented by certain denser spicular tracts, in which occasionally traces of the typical Axinellid arrangement of the spicules may be observed.

Spicules.—Styli of two chief forms:—(*a*) Short, stout, more or less bent, gradually sharp-pointed at the apex, and evenly rounded off at the base (fig. 6, *b*, *c*); size about 0·4 by 0·021 millim. (*b*) A comparatively small number of very long and very slender slightly curved styli (fig. 6, *e*), evenly

* Report on Sponges dredged up in the Arctic Sea by the 'Willem Barents' in the years 1878 and 1879, p. 40.

† P. 341.

‡ *Cf.* Ridley and Dendy, Report on the 'Challenger' Monaxonida, p. 187.

rounded off at the base (or becoming tylostylote), and very gradually sharp-pointed at the apex; size when full-grown about 1·2 by 0·011 millim. There are also a few cylindrical forms (strongyla) (fig. 6, *d*) and still fewer oxea (fig. 6, *a*); but these are probably only abnormal developments of the short stout styli such as are frequently found in Axinellids.

There are three dry specimens of this sponge and a piece in spirit.

CERATOSA.

Spongionella nigra, n. sp.

Sponge sessile, consisting of a number of vertical lamellæ, branching and anastomosing with one another often in a very complex manner. The largest of the four dry specimens is about 250 millim. high and the same in breadth, and the thickness of the lamellæ is about 5 millim. The colour of the living sponge is black, when dry dull black, and in spirit rather lighter blackish grey. Texture tough and resilient. Surface (dry and in spirit) granulated. The oscula are abundantly scattered, usually on the inwardly turned surfaces of the lamellæ, and almost or quite confined to one surface of each lamella; they are about 1–2 millim. in diameter and are compound, each consisting of an aggregation of several smaller ones.

The dermal skeleton is a well-developed but irregular network of horny fibre with fairly wide polygonal meshes; the fibres averaging about 0·02 millim. in diameter.

The main skeleton is a rectangularly meshed network of very distinct primary and secondary fibres; the primary fibres average about 0·049 millim. in diameter and the secondaries about half as much.

All the fibres of the skeleton are composed of pale-coloured spongin without any trace of foreign enclosures. The fibres are solid, and it is difficult to make out any distinct central granular core, though possibly such may exist, at any rate in some cases.

The ectosome is represented by the thin dermal membrane. The choanosome is very delicate and gelatinous, containing a large number of amœboid and stellate cells. The canal-system is eminently lacunar and the lacunæ are very strongly developed. The flagellated chambers are irregularly sac-shaped and they vary much in size, the full-grown chambers averaging about 0·07 millim. in diameter. They are not placed very close together and lie irregularly scattered through

the choanosome, so as to leave frequent wide interspaces devoid of chambers. They open directly into the excurrent lacunæ.

This is a very remarkable and interesting species, one of the most striking features of which is the large size of the flagellated chambers. These chambers are conspicuous objects even in unstained, hand-cut, rough preparations of ordinary spirit material.

The genus was founded by Bowerbank for his *Spongionella pulchella*, a British species*, and he afterwards described† another species, *S. Holdsworthii*, from the Ceylon Pearl Banks. All his specimens of the genus appear to have been dry, and I am now able, from my examination of the spirit-preserved material sent by Mr. Thurston, to amend his original diagnosis as follows :—"Genus *Spongionella*, Bowerbank. Sponge consisting of flattened lamellæ. Main skeleton of very distinct primary and secondary fibres without foreign enclosures, arranged so as to leave rectangular meshes. Ectosome a thin dermal membrane. Choanosome extremely delicate, transparent and gelatinous. Canal-system lacunar. Flagellated chambers very large, irregularly sac-shaped, opening directly into the excurrent lacunæ."

The genus possibly finds its nearest ally in *Spongelia*, and would fall under Lendenfeld's subfamily Spongelinæ ‡. It presents, however, very striking resemblances to the Chalininæ. These resemblances are most apparent in the general external form and in the structure and arrangement of the horny fibres (except of course as regards the total absence of spicules). The histological character of the choanosome also agrees with that found in Chalininæ §; but the flagellated chambers are very much larger, and this would appear to be an important distinction ‖.

According to Vosmaer ¶ Bowerbank's *Spongionella* is synonymous with Schmidt's *Cacospongia*. This is a difficult question, and in order to settle it we require a much more extensive knowledge of the anatomy of these forms. According to Lendenfeld ** *Cacospongia* is one of those forms

* *Vide* Mon. Brit. Spong. vol. i. pl. xxxvii. fig. 380, vol. ii. pp. 12, 359, vol. iii. pl. lxv.

† Proc. Zool. Soc. Lond. 1873, p. 25.

‡ *Vide* Proc. Zool. Soc. Lond. 1886, p. 589.

§ *Vide* Lendenfeld, 'Zoologische Jahrbücher,' Band ii. p. 734.

‖ *Vide* Lendenfeld, *loc. cit.*; also Dendy, Proc. Zool. Soc. Lond. 1887, p. 526.

¶ "Porifera," in Bronn's Klass. und Ordnung. des Thierreichs, p. 364.

** Proc. Zool. Soc. Lond. 1886, p. 587.

which have "small, spherical, ciliated chambers and opaque ground-substance," and therefore it differs greatly from *Spongionella nigra*; but whether Dr. Bowerbank's two species of *Spongionella* agree in these respects with *Cacospongia* or with *Spongionella nigra* is at present undeterminable. As I cannot place my species under *Cacospongia*, I think it better to retain Dr. Bowerbank's *Spongionella* with emended diagnosis in preference to creating a new genus.

Hircinia clathrata, Carter *.

This common Ceylon species is represented in the collection by two good specimens; unfortunately, however, there is no piece in spirit. One of the two specimens is remarkable on account of its large size and luxuriant growth; it measures 280 millim. in height and 250 millim. in greatest breadth. The other specimen, although smaller, is of great value in that it exhibits certain features not hitherto observed in the species. The specimen has been dried with the soft tissues on, and instead of being of the usual dull yellow colour, it has a distinctly purple tinge. In his original description of the species Mr. Carter suggested that "the sarcode of *H. clathrata* may have been so coloured," but he was unable to show that it was so from the material at his disposal †. The particular specimen referred to also shows that the wide irregular openings on the surface of the sponge, which lead into the central cavity of the tubular branches, are normally tympanized by a delicate translucent membrane, pierced in places by rounded apertures resembling oscula.

For the geographical distribution of this species the reader is referred to my previous paper ‡. I may add that there is in the collection of the British Museum a specimen § of a slight variety of the species from North-western Australia. This Australian variety differs from the Manaar specimens chiefly in the larger quantity of foreign matter present in the primary fibres.

Hircinia (?) sp.

There are in the collection some pieces of a sponge which

* For references *vide* Dendy, Ann. & Mag. Nat. Hist. ser. 5, vol. xx. p. 163.

† There is, however, a small specimen of *Hircinia clathrata* attached to the same stone as the specimen of *Siphonochalina communis*, and Mr. Thurston says that the colour of this small specimen in life was reddish brown.

‡ *Loc. cit.* § Registered 83. 2. 22. 19.

I refer provisionally to the genus *Hircinia*. They consist of branched digitate processes about 15 millim. in diameter, with strongly and regularly conulose surface. Colour of the living sponge blackish grey, in the dry state almost black, and in spirit dark grey. Texture in the dry state hard and incompressible, in spirit softer, compact, cork-like. In external appearance this species bears a most striking resemblance to a specimen of Schmidt's *Hircinia dendroides* * in the British Museum. I have found the characteristic "filaments" only in one place.

Aplysina purpurea, Carter.

1880. *Aplysina purpurea*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 36.
1881. *Aplysina purpurea*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. viii. p. 103, pl. ix. figs. 1, *a–i*, and 2, *a–c*.

The single dry specimen in the collection is conical in form, slightly flattened in one plane, with broad base and bluntly rounded apex. It measures 195 millim. in height and the greatest breadth of the base is about 110 millim.

The colour in the living state was grey; when dry it is a black-purple and in spirit a little lighter purple. The surface of the dry sponge is thickly covered with large conical projections, due to the ends of the stout compound skeleton-fibres supporting the dermal membrane in a tent-like fashion. The dermal membrane is shrunk in between the projections, which are probably more prominent in dry specimens than in life; it exhibits only occasionally the minute reticulation mentioned by Mr. Carter.

The oscula vary in size and are irregularly scattered over the surface of the sponge; it is a rather curious fact that they are not more numerous at the apex of the sponge than elsewhere. Sometimes they are fairly large and single and sometimes they are small and grouped.

The structure of the dry sponge internally is very cavernous; the texture of the pieces in spirit is compact and cork-like.

The skeleton, as already described and figured by Mr. Carter, is composed of compound fibres. These compound fibres are, however, merely dense local aggregations of branching and anastomosing horny fibres accumulated along certain tracts so as to leave the remainder of the sponge free from skeletal elements. That this is the case appears from

* Registered 67. 7. 26. 79.

the fact that flagellated chambers occur scattered between the individual fibres in a compound fibre.

The compound fibres are very stout and very widely separated from one another, terminating in the surface conuli. Each compound fibre may be as much as 2 millim. in diameter in the dry condition.

Mr. Carter's first description of this species was very imperfect; the specimen upon which it was founded came from the Gulf of Manaar. His second description, founded on a specimen from Ceylon and one from Australia, leaves no doubt in my mind as to the correctness of my identification; but I think it very probable that the Australian specimen described by Mr. Carter belongs to a different species.

Aplysina fusca, Carter.

1880. *Aplysina fusca*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 36 (*vide* also ser. 5, vol. viii. p. 107).

I refer three dry specimens present in the collection to this species. They are necessarily lobate or digitate, and the surface is beset with abundant small, sharp, conical eminences, between which the dermal membrane is shrunk down. The surface is glabrous or subglabrous, and the texture in the dry state is very hard and incompressible, membranous. Colour in the dry state dark brown. The largest specimen is 195 millim. high by about 160 millim. in greatest breadth. Two of the specimens are cavernous internally, while the third appears to be much more solid; I do not think, however, that there is any specific difference between them.

I have very little doubt that this is Mr. Carter's *Aplysina fusca* (especially as the type of the species came from the Gulf of Manaar), although I have not had the opportunity of studying the type, and the original description is too short to make an identification as reliable as might be desired. In Mr. Carter's second account of the species* very little is added to the first.

EXPLANATION OF THE PLATES.

Plate III.

Fig. 1. *Petrosia testudinaria*, from the neighbourhood of the Tuticorin Pearl Banks. Collected by Mr. Thurston.

Fig. 2. *Petrosia testudinaria*, from Padau Bay, Mergui Islands. Collected by Dr. Anderson.

* *Loc. cit.*

Fig. 3. *Petrosia testudinaria*, from the Straits of Malacca. Registered 83. 11. 8. 28 in the British Museum collection.

[All three figures are from photographs taken by Mr. Gepp from specimens in the British Museum, and they are all very much reduced.]

PLATE IV.

Fig. 4. Spicules of *Rhaphidophlus spiculosus* (drawn under Zeiss E, Ocular 2, Camera). *a*, *b*, *c*, large tylostylote; *d*, *e*, small spined tylostylote.

Fig. 5. Spicules of *Hymeniacidon? fœtida* (drawn under Zeiss C, Ocular 2, Camera). *a*, small stylote; *b*, large oxeote.

Fig. 6. Spicules of *Acanthella Carteri* (drawn under Zeiss C, Ocular 2, Camera). *a*, oxeote; *b*, *c*, *e*, stylote; *d*, strongylote.

Fig. 7. Spicules of *Gelliodes carnosa* (drawn under Zeiss E, Ocular 2, Camera). *a*, *b*, oxeote; *c*, sigmata.

Fig. 8. Spicules of *Clathria corallitincta* (drawn under Zeiss E, Ocular 2, Camera). *a*, *b*, *c*, stylote; *d*, spined tylostylote.

Fig. 9. Spicules of *Reniera madrepora* (drawn under Zeiss C, Ocular 2, Camera). *a*, *b*, *c*, oxeote; *d*, stylote (abnormal).

Fig. 10. Spicules of *Clathria indica* (drawn under Zeiss E, Ocular 2, Camera). *a*, *b*, tylostylote, verging upon unequal-ended oxeote; *c*, spined stylote.

PLATE V.

Fig. 11. *Axinella tubulata*, section taken at right angles to the surface, showing tubes of the commensal Annelid. *a*, tube with worm in it; *b*, *c*, empty tubes.

Fig. 12. Spicules of *Axinella labyrinthica* (drawn under Zeiss C, Ocular 2, Camera). *a*, strongylote; *b*, *c*, stylote.

Fig. 13. Spicules of *Auletta aurantiaca* (drawn under Zeiss C, Ocular 2, Camera). *a*, *b*, *d*, stylote; *c*, *e*, oxeote.

X.—*On a new British Species of* Microciona, *Bk., in which the ends of the Tricurvate are Spiniferous &c.* By H. J. CARTER, F.R.S. &c., and R. HOPE, F.Z.S.

[Plate VI.]

§ 1. *By* Mr. CARTER.

THIS species was conjecturally referred by me to *Microciona armata*, Bk. ('Annals,' 1874, vol. xiv. pp. 456, 457), on the supposition that the spiniferous character of the ends of the tricurvate spicules had been overlooked by Bowerbank. I now find I was mistaken, on which account it has probably hitherto failed to be considered a distinct species, and therefore has been